



The safest, most innovative & sustainable museum crate in the world

SINCE 1994



TURTLE[®]
UNLTD





Since 1994 Turtle has been used by museums across the globe for the safe transportation of valuable artworks. Through years of innovation, Turtle has been developed to an unrivaled level. As a result of the collaboration with our respected partners, Turtle is now available worldwide.

The safest, most innovative & sustainable museum crate in the world is now available worldwide

Turtle brings the standard of fine art packaging to its highest level. The protection that Turtle provides against even the smallest variations in relative humidity and temperature is unequalled, and the customized internal technology of this crate results in an unsurpassed absorption of both shock and vibration.

Turtle is the most sustainable climate crate available on the market today. The expected lifespan of a Turtle is at least 20 years, which provides the most efficient rental capacity available and an effective way for museums to reduce their ecological footprint.

Trust Turtle to look after your artwork

Turtle can now also be your solution for shipping high-end art. Find out about the possibilities in your country through our worldwide network of partners: Masterpiece (USA), Constantine (UK), Møbeltransport (Scandinavia), Global (Australia, New Zealand and Singapore) and Hizkia van Kralingen (Benelux).



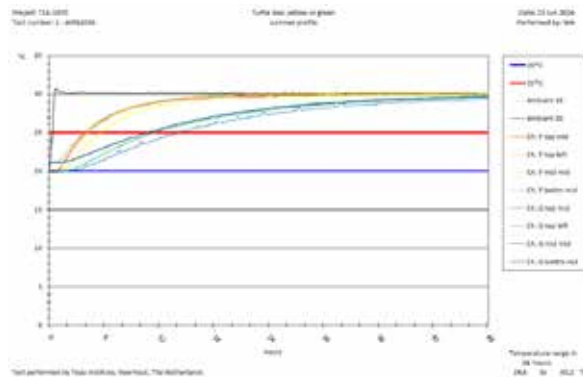
Turtle uNLtd test results on temperature and humidity



5. Test results

5.1 Temperature test +20°C to +30°C

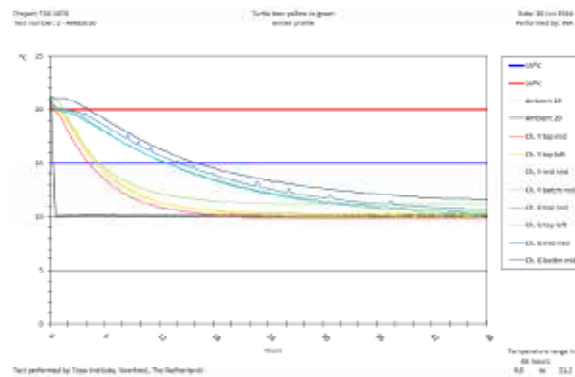
To simulate the packing of the Turtle boxes in the museum (conditioned room temperature of 20°C and 50% RH) and then shipping of the Turtle boxes worldwide (controlled conditions, but short spikes are possible), a temperature test starting at +20°C up to +30°C is performed.



Reached	Turtle box yellow	Turtle box green
	After ... hours	After ... hours
20°C	0,0	0,0
22°C	1,5	3,5
24°C	3,0	8,0
26°C	5,0	13,5
28°C	8,0	23,0
30°C	21,5	>48,0

5.2 Temperature test +20°C to +10°C

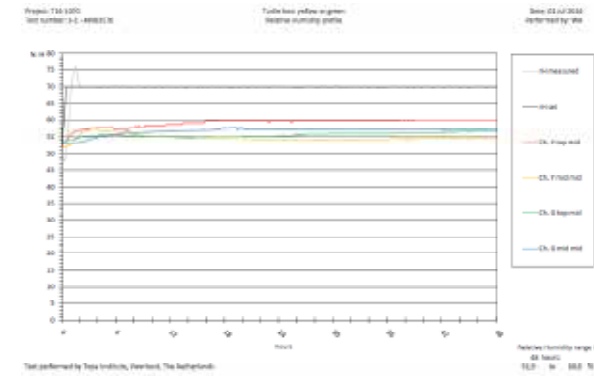
To simulate the packing of the Turtle boxes in the museum (conditioned room temperature of 20°C and 50% RH) and then shipping of the Turtle boxes worldwide (controlled conditions, but short spikes are possible), a temperature test starting at +20°C down to +10°C is performed.



Reached	Turtle box yellow	Turtle box green
	After ... hours	After ... hours
20°C	0,0	0,0
18°C	1,5	5,5
16°C	3,3	10,0
14°C	5,0	15,5
12°C	8,5	25,0
10°C	20,0	>48,0

5.3 Climate test 50% RH to 70% RH

During worldwide transport the relative humidity conditions differ. To research the influence of changing humidity conditions on the Turtle box, more specific, the painting inside the Turtle box, a climate test with increasing relative humidity (from 50% RH up to 70% RH) is performed.



Reached	Turtle box yellow	Turtle box green
	After ... hours	After ... hours
50% RH	0,0	0,0
52% RH	0,0	0,0
54% RH	0,5	0,5
56% RH	1,0	6,5
58% RH	5,5	>48,0
60% RH	37,5	>48,0

Vibration

To investigate the influence of vibration on the Turtle boxes, a sine sweep from 3 Hz to 200 Hz at 0,5 G is performed. These frequencies are chosen because they are most likely to occur during regular truck and air transport.

Turtle box yellow	Turtle box, green, standard corners	Turtle box, green, thicker corners
2,35 G @ 31 Hz	1,13 G @ 49 Hz	1,19 G @ 24,5 Hz
Amplification of 5	Amplification of 2	Amplification of 2

The amplification of the Turtle box green is 2, against the amplification of 5 of the Turtle box yellow. The Turtle box green performed much better on the vibration.

Temperature conditions

To simulate the packing of the Turtle boxes in the museum (conditioned room temperature of 20°C and 50% RH) and then shipping of the Turtle boxes worldwide (controlled conditions, but short spikes are possible), two temperature tests are performed: one up to 30°C and one down to 10°C.

Reached	Turtle box yellow	Turtle box green
+30°C	After 21,5 hours	After >48 hours
+10°C	After 20,0 hours	After >48 hours

The Turtle box green performed twice as good as the Turtle box yellow.

Humidity conditions

During worldwide transport the relative humidity conditions differ. To research the influence of changing humidity conditions on the Turtle box, more specific, the painting inside the Turtle box, a climate test with increasing relative humidity (from 50% RH to 70% RH) is performed.

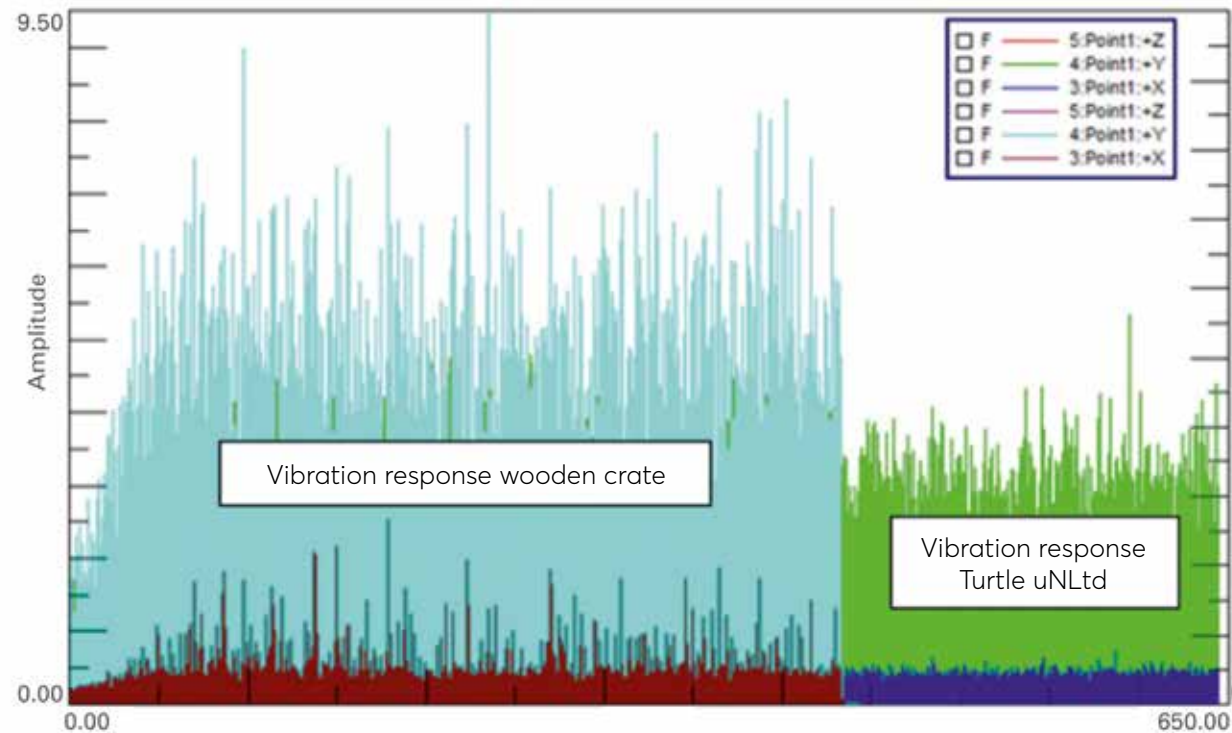
Reached	Turtle box yellow	Turtle box green
60% RH	After 37,5 hours	After >48 hours

The Turtle box green performed better than the Turtle box yellow.



FRAGILE





The measured results show that, where the stimulus remains equal, the middle point of the canvas of the painting vibrates, when it's packed inside the Turtle crate, with only 50% of the vibrational amplitude which occurs when it's packed inside the conventional wooden crate.

Turtle uNLtd test results on shock and vibrations

In the latest *Restauro* magazine of October 2018 'The safe transport of works of art and cultural artefacts' the effectiveness of Turtle against impact and vibration was investigated and tested by the independent vibration-stress expert Dr. Kracht Vibration Management.

It is crucial to ensure stable climatic conditions during the entire process of transport. Super-sensitive sensors were used to monitor the crates' reactions to fluctuations in environmental conditions.

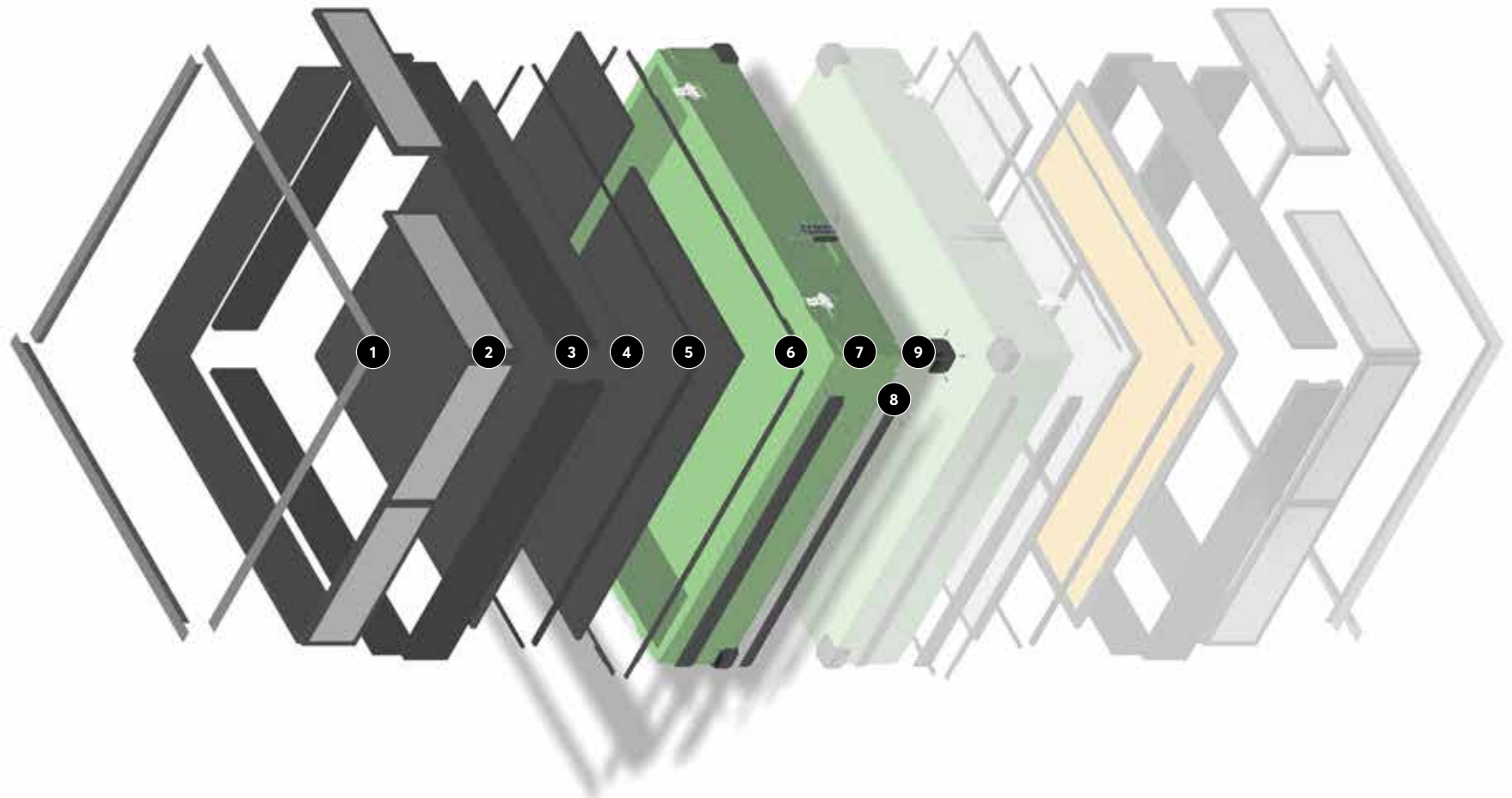
But why does a painting inside a Turtle crate vibrate only half so much as one packed inside a wooden climate crate? Information about this is provided by the experimental modal analysis using approx. 170 measuring points on both cases. The reasons for the Turtle crate's offering lower transfer-factors and thus better preserving the painting from vibrations during transport lie in the structure

of the crate and the materials used to make it. These latter lead to a greater degree of rigidity than is found in the wooden crate and thus to an augmented attenuation. The greater weight of the Turtle crate also contributes significantly to the vibration-reduction.

The analyses confirm that not only does the latest development on the market, the Turtle uNLtd, "save the lives" of 40 trees per wooden crate the vibrations undergone by a painting packed inside a Turtle uNLtd amount to only 50% of those undergone by the same painting when packed inside a wooden climate crate. Moreover, the Turtle uNLtd maintains climatic conditions in its interior constant for 48 hours. The Turtle uNLtd thus sets the current standard for the physics-dynamic performance of painting transport crates.

For more test results please visit: www.turtlebox.com



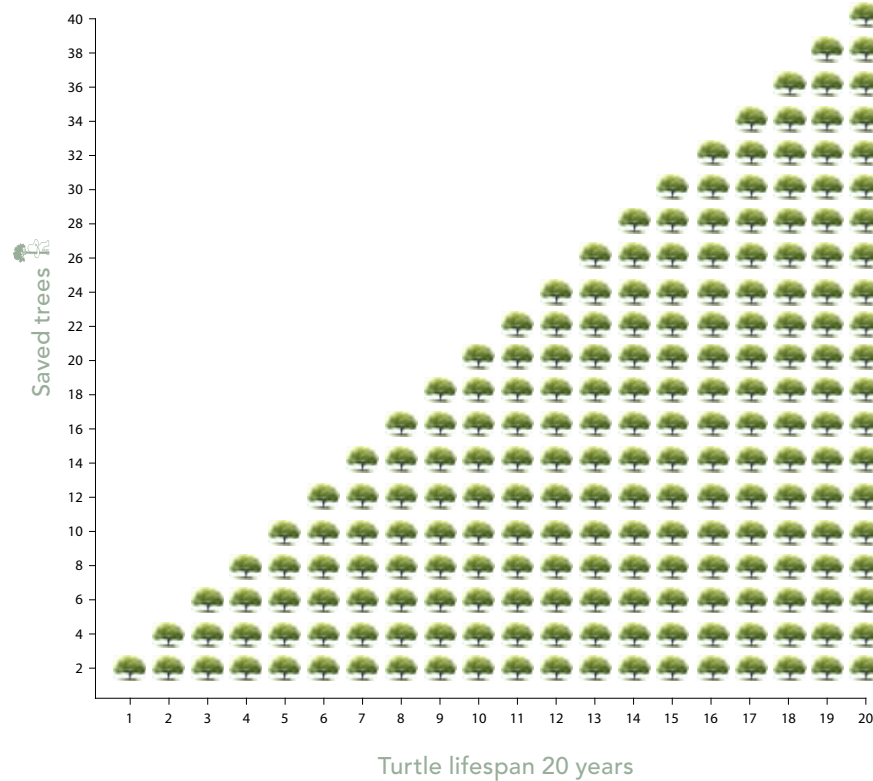


Construction

Construction of the Turtle uNLtd:

1. Plastic angle section to protect the foam in the crate interior
2. Insulating panels
3. Interior foam: polyurethane foam and Plastazote
4. Plywood panel made of birchwood coated with Velcro
5. Foam encasing the plywood panels
6. Insulating corner brackets
7. Crate made from high-tech compound materials with foam core
8. Nylon-HMPE sliding bolt
9. Protective rubber corner-pieces.



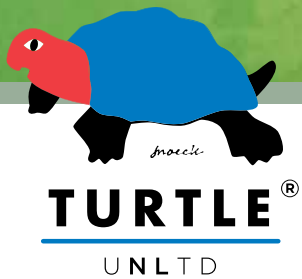


How green is Turtle?

It is our responsibility to offer a sustainable solution for the transportation of art and we are pleased to show that Turtle is capable of making a contribution.

The Turtle's service life is at least two decades. This means that for over two decades no separate wooden crates need to be made for artworks, saving more than two trees a year for each Turtle in use. The crate's insulation can furthermore be recycled after the crate has been written off, so the Turtle's ecological footprint gets smaller each time it is used.





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